PROPOSAL SUBMITTAL--SIG GRAPH 96 APPLICATIONS

VISUALIZATION OF EARTH AND SPACE SCIENCE DATA AT JPL's SCIENCE DATA PROCESSING SYSTEMS SECTION

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Organizer Qualifications: BS Physics, MS Engineering, over 25 years experience in development and operation of computer systems for image and science data processing applications. 15 years experience at JPL in processing image data and other remotely sensed data from NASA's planetary exploration and earth observation missions. Author of three textbooks in computer image processing and over 30 technical papers, Has taught image processing at California State University Northridge, Harvard and George Washington Universitites. Senior member IEEE.

Description of the application: This presentation will provide an overview of systems in use at NASA's Jet Propulsion Laboratory for processing data returned by space exploration and earth observations spacecraft, Graphical and visualization techniques used to query and retrieve data from large scientific data bases will be described. The talk will be illustrated with examples of high level graphical user interfaces and examples of visual ization and animation products generated by the systems described. NOTE: Tthe majority of the systems described in this overview will be available for interactive user participation in the Digital Bayou.

Type of presentation: 20 to 30 minute talk

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DISCUSSION

This presentation will provide an overview of systems in use at NASA's Jet Propulsion Laboratory for processing data returned by space exploration and earth observations spacecraft. Graphical and visualization techniques used to query and retrieve data from large scientific data bases will be described. The talk will be illustrated with examples of high level graphical user interfaces and examples of visualization and animation products generated by the systems described. (NOTE: The majority of the systems described in this overview will be available for interactive user participation in the Bayou.)

The actual systems to be described at Siggraph 96 will be a function to some extent of events that transpire between this submittal and the Conference. For example, the Galileo spacecraft is in orbit around Jupiter and will return science data starting in June 1996. Presentation of information from that mission will depend on data availability, but the intent will be to show the most recent publically released data from that mission as part of this presentation. In the Earth Observations area, applications will be selected from a variety of on-going programs at J 1'1., including, data processing applied to remote] y sensed data acquired by sensor systems flown on aircraft and earth orbitting spacecraft.

The systems that can DEFINITELY be described at Siggraph 96 in this talk include the following:

The Science Analysis Graphics Environment (SAGE), a graphical interface used to control processing of imaging and other science data returned by solar system exploration spacecraft, The VICAR image processing software system consists of approximately 400,000 lines of applications code developed during the past 25 years at JPL. SAGE was developed to provide a high level interactive graphical user interface to that software system. It is possible to use SAGE to link image processing modules into processing sequences, and to spawn multiple processing streams utilizing the same source data. SAGE can be used for image enhancement of individual images or for control of systematic production processing of hundreds of images. Unique applications capabilities within the system will be described, including software used to remove instrument signature from remote] y sensed data, to perform cartographic projecti on of planetary imagery, and to perform color image product ion from multiple exposures acquired by a spacecraft imaging system that is in motion. SAGE has made it possible to minimize the training time required to process planetary exploration information by JPL staff members. It is also being distributed to science teams located at various educational institutions, where it enables use of a unique set of image processing capabilities with a minimum of user training.

Mission operations support software that will be used to support the Mars Pathfinder mission in] 997, providing stereoscopic mission planning tools for supporting rover navigation on the surface of Mars. The Mars Pathfinder mission includes a lander and a rover that will be deployed within the field of view of stereo cameras positioned on the J ander. The operations requirements for the mission will be described, and examples will

be shown of the system that has. been developed to support this mission. Mars Pathfinder will be launched shortly after Siggraph 96 and wili arrive at Mars in 1997.

Software systsems used to produce animation and "fly-over" sequences from data of the earth (1 .andsat, Synthetic Aperture Radar systems, etc.) and the planets (Mars, Jupiter, Venus, etc.). JPL has produced many animations in support of science analysis of remote] y sensed data for over 10 years. The systems and technology used to produce these animations will be described and illustrated with tile most recent available examples.

VISTAS, an interactive tool for query/retrieval/analysis of TOVS earth observation data. This system provides support to query and retrieval of remotely sensed data from a large global time varying data base. The system includes query and browse capability as well as spectral anal ysis capabilities.

Airborne Visible and Infra-Red imaging Spectrometer (AVIRIS) multispectral scanner data processing, visualization and analysis software. AVIRIS is an airborne instrument that acquires high resolution imagery of the earth's surface in over 200 spectral bands. The software used to process and display this data will be explained.

The Planetary Photojournal, a graphical user interface that provides public internet access to image data sets acquired by NASA's solar system exploration spacecraft.

The systems that MAY be described at Siggraph 96 in this talk, based on availability of data and other conditions at the time of Siggraph 96, include the following

A working prototype of software to be used to process data returned by the Atmospheric Infra-red Sounder (AIRS) to be flown as part of NASA's Mission to Planet Earth.

Systems used for real time display and visualization of data returned by the Galileo mission to Jupiter.

EQUIPMENT REQUIREMENTS: 35mm slide projector, viewgraph projector, VCR & video projector.